

Title: Upstream larval supply to Florida Bay – the Dry Tortugas connection

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Themes: (2) Fisheries Dynamics and (3) Regional Coastal Ecosystem Processes

Goal: Understanding the impact of the regional physical oceanography on the supply of early life stages to marine populations.

The linkages between the spawning potential of offshore, upstream habitats and the Florida Bay nursery is a foundation of South Florida ecosystem. Regional circulation can bring larvae to the Bay from the Dry Tortugas spawning ground 150 km upstream, or from as far as the Caribbean Sea. What are the contributions of these upstream larval sources to local marine populations? Does recruitment variability depend on the pathways and processes linking these sources to South Florida? Management strategies hinge upon the understanding of these connections.

The Dry Tortugas is not only a major spawning ground, the mesoscale hydrodynamics there are believed to play a key role in larval supply. The Tortugas eddy that resides there for periods of up to three months provides a retention mechanism in a nutrient-rich pelagic upwelling environment. Subsequently, when the eddy propagates towards the Florida Keys as a coastal eddy, it can act as an effective transport and detrainment vehicle, facilitating the migration of young stages into the Bay. Synoptic oceanographic surveys that can capture large-scale physical and biological patterns over a relatively short time are initiated to study these processes. Two multidisciplinary cruises conducted respectively on May 1-9 (GU0202) and August 1-12 (GU0204) of 2002 highlighted the remarkable short-term variability in the oceanic processes. The Tortugas eddy was absent in GU0202, but its possible precursor, a Loop Current frontal eddy was well developed (Fig. 1A). High chlorophyll concentration was found in and around the Loop Current frontal eddy and at the edge of the SW Florida Shelf, where “blackwater” was reported. In GU0204, the Tortugas eddy was firmly in place and the physics and biology was intensively sampled (Fig. 1B).

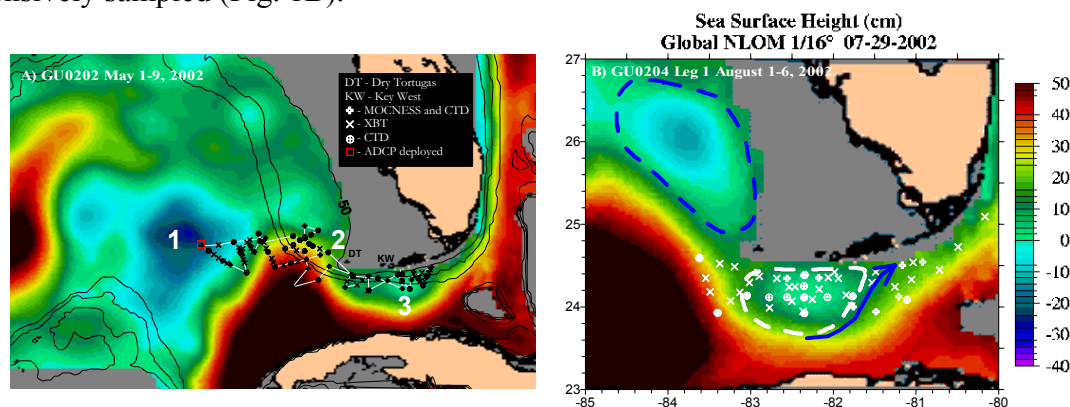


Fig. 1. Sampling stations on A) GU0202 and B) GU0204, respectively superimposed on NLOM SSH imagery depicting contemporaneous oceanography in the Gulf of Mexico and Straits of Florida. GU0202 covered notable mesoscale events depicted in the imagery: 1- Loop Current frontal cold core eddy, possible precursor to Tortugas eddy; 2 - high primary productivity, coinciding with reported location of "blackwater" event; 3 - cold core eddy off Lower Florida Keys. GU0204 targeted the strong Tortugas eddy present during that time (delineated with white dashed line). Blue arrows marks the Florida Current front displaced offshore by the eddy. A Loop Current frontal eddy (blue dashed line) is just upstream of the Dry Tortugas.

These investigations will extend beyond 2002, which happens to be an El Niño year, to capture environmental variabilities on the interannual and interdecadal scales that influence the climate and productivity of this region.